

Open Government Data Assessment Model: *An indicator development in Thailand*

Chatipot Srimuang*, Nagul Cooharajanane**, Uthai Tanlamai*, Achara Chandrachai**

* Technoprenurship and Innovation Management Program, Graduate School, Chulalongkorn University, Thailand

** Department of Mathematics and Computer Science, Faculty of Science, Chulalongkorn University, Thailand

* Department of Accountancy, Chulalongkorn Business School, Chulalongkorn University, Thailand

**Department of Commerce, Chulalongkorn Business School, Chulalongkorn University, Thailand

joesichon@gmail.com, nagul.c@chula.ac.th, uthai@cbs.chula.ac.th, achandrachai@gmail.com

Abstract— Social networking is rapidly growing so much so that it has become a driving force for governments to access data which allows citizens without any restrictions over the World's social media. In 2015, the Thai government released a three year Digital Government Development Plan. This plan is a performance guideline of the e-government and for the open government data of the country. Several countries have conducted research on the Open Government Data Assessment but their research does not suit the context of Thailand. Therefore, the purpose of the present review and research presentation is to assess and evaluate the degree of development of the Open Government Data components that exist in the country. The methodology used in the evaluation and validation of this research consist of interviewing officials of top government management agencies responsible for e-government and the Digital Government Development Plan in Thailand. This research identified nine key components: Policies and Plans, Laws and regulations, Organization, Enterprise architecture, Capabilities enhancement, Open government principles, Technology infrastructure, Innovation and participation of citizens. Detailed components of each topic and subtopic are provided below.

Keywords— Open Government Data, Evaluate Open Government Data, Open Data Assessment, Open Data Benchmarking, Open Data

I. INTRODUCTION

The advancement of the internet and the rapid growth of social media have become a driving force for all governments around the world to be more transparent especially with social medias such as Facebook, Line and Twitter which are a two way communication tool that have gone a long way to improve the relationship between government agencies and the citizens. In recent years, governments all over the world released open government initiatives which are aimed at more transparency. In this research, Open government concept is demonstrated under three components namely: participation, transparency and cooperation of citizens in public policies making. In this area, Open Government Data (OGD) concept is a working philosophy which enables citizens to have free access to public data without any restrictions. The citizens can freely use, store, redistribute and integrate data which is generated by public organizations. One of the main goals of OGD is to encourage

the private sector to create products and services innovation that provide interactive access to the public data from government sector [6]. The initial open government ambition was to support government accountability and transparency through promoting successful business innovation [3].

Recently, the Thai government released the Digital Economic Plan of Thailand and Thailand's three years Digital Government Plan. The three years plan contains a plan for Open government data which can be instrumental in improving the transparency of the country's media. In these three years, the Thai Government wants to accelerate Digital Government with four strategies which are: 1) government integration. 2) Smart operations. 3) Citizen-centric services and 4) Driven transformation [5].

However, there are various problems with open government data in Thailand. Open government data will have to comply with the existing degree of data privacy and data protection. The general perception that open government data is a tool that public agencies release official data for the consumption of the general public might not be possible in all cases [16]. The situation in Thailand differs from what happened in the United States in 2009. In December 2009, President Obama issued a Memorandum on the Freedom of Information Act, as "the most prominent expression of a profound national commitment to ensuring an open government" [9]. This memorandum was seen as the Open Government Directives with which all Ministerial departments and public agencies have to comply [14].

Nonetheless, without an assessment model to evaluate open government data development, Thailand Government may not know when it has become a successful digital government. Thus, the purpose of this paper is to propose a new workable assessment model using nine perspectives of open government data which relate to both the Digital Economic Plan of Thailand and Thailand's three years Digital Government Plan. The assessment model allows the Thai government agencies to assess their current operations and trustable data during the development stage of digital government.

This paper is divided into five sections. In the first section, we have dealt with the introduction. In the second section, a

review of the existing background literature on open government data is presented, the third section describes methodology to develop an indicator. In the fourth section, a result of in-depth interviews and the item objective congruence (IOC) are presented. Finally, the last section concludes with research summary and proposed future research.

II. CONCEPTUAL BACKGROUND

One of the reasons why researchers in each country all over the world are working hard to develop assessment model for open government data is because of the lack of assessment framework suitable for specific countries circumstances such as laws and regulations. Thus, it is imperative to develop an open government data assessment model that is workable for each country. Not only will it help researchers better understand an open government data setting, but it will also set a framework which will serve as an important tool to benchmark the progress of open government from one country to another. In this section, the definition of Open Government Data and existing open government data frameworks literature are reviewed.

A. Definition of Open Government Data (OGD)

Albeit, there are many published researches on OGD. The definition of OGD is still imprecise. Open government establishes a system of transparency, public participation and collaboration which allows citizens to access and use public data to improve public services [11]. Therefore, the term open government can be defined as follows [16].

- A platform which transfers government data to citizens.
- It allows citizens to use, interact and license with those data.
- These transformations empower public agencies to approve official data before releasing it to the citizens.

Another definition for open government data is the data that is produced by government agencies or government controlled entities that collect, store and disseminate this data to be reused for innovation and creation by private organizations [4]. In other words, Parycek et al., (2014) defined the open government data as “all data of the public sector which could be made accessible by government in a public interest without any restrictions for usage and distribution”.

In this paper, the definition of open government data is that data which has been collected and stored by government agencies, especially public organizations, which are accredited by the Official Information Act, B.E. 2540 (1997) in Thailand and abide by related regulations including privacy, confidentiality and security principles. The data is made accessible to the general public through a single data portal. Also, an open government data only releases data that allows the public to access it through a data portal.

B. Review on Open Government Data Assessment

Previous literature reveals that there are various perspectives being used to describe an Open Government Data

Assessment Model (Table 1). Some perspectives in one model overlap with other models.

TABLE 1. REVIEW ON OPEN GOVERNMENT DATA ASSESSMENT

Criteria	Items	Literature review
Policy and Plan	<i>Government policy:</i> Policy and strategy establishment was supported by laws, regulations and training. Public policy and direction are usually implemented at all government agencies.	[1] [2] [7] [11] [15] [16]
	<i>Government plan:</i> Plan and direction of government to achieve goal.	[1] [2] [7]
	<i>Visions:</i> The statement or goal of OGD and practice.	[2] [7]
Law and regulations	<i>Laws and regulations:</i> Legislative was significant because open data should comply with legislation, including freedom of information acts	[11] [2] [13] [17]
	<i>Directive:</i> Command from government leader.	[17]
	<i>Government leadership:</i> Capabilities are available to successfully lead an OGD process.	[10] [11] [13]
Organization	<i>Organization leadership:</i> Capabilities are available to successfully lead an OGD process within government agencies.	[11] [17]
	<i>Organization policy:</i> The internal policy should relate and support government policy.	[10] [17]
	<i>Commitments:</i> Ability to rely on international standard.	[1] [13]
Personal capabilities	<i>Training:</i> Staff trained in OGD skills.	[2] [13]
	<i>Personal evaluations:</i> Program to develop and measurement associated to OGD.	[2] [13]
Technology Infrastructure	<i>Infrastructure:</i> The platform provides datasets and complete data with all required fields and detail	[1] [15] [17]
	<i>OGD portal:</i> Government central portal that released data.	[8] [10]
	<i>Interoperation:</i> System works with other system without any restrictions.	[1] [15] [17]
	<i>Networking:</i>	[1] [15] [17]

Criteria	Items	Literature review
Open government data principle	significant aspect of organizational competitiveness	
	<i>Metadata:</i> Type and existing metadata.	[1] [2] [15]
	<i>Data priority:</i> Prioritize data in public organization.	[11] [14]
	<i>Completeness:</i> Data must be complete.	[4] [8] [9] [13] [14]
	<i>Privacy:</i> It should be primary data and personal data.	[4] [8] [9] [13] [14]
	<i>Timeliness:</i> Data update automatic and protocol.	[4] [8] [9] [13] [14]
	<i>Electronic access:</i> Access to data via central portal.	[4] [8] [9] [13] [14]
	<i>Machine Readability:</i> Data can read and accessible through database language.	[4] [8] [9] [13] [14]
	<i>Non-discrimination:</i> Any person can access the data at any time and without having to identify themselves	[4] [8] [9] [13] [14]
	<i>Licensing:</i> Implication's degree of entities in public participation and reaction when facing the improvement to data publication and reuse.	[4] [8] [9] [13] [14]
Innovation	<i>Permanence:</i> Data is available online in perpetuity.	[4] [8] [9] [13] [14]
	<i>Usage Costs:</i> The data are not restricted by copyright.	[4] [8] [9] [13] [14]
Participation	<i>Use of Commonly Owned Standards):</i> Standards refers to who owns the format in which data is stored.	[4] [8] [9] [13] [14]
	<i>Applications:</i> Open data can help service creation and product innovations.	[1] [13] [7]
Participation	<i>Product innovation:</i> Any product that produce from released public data	[1] [13] [7]
	<i>Data access:</i> data access can be measured as access indicators or degree of involvement	[11] [8] [13]
	<i>Complaints and solutions:</i> Reception, recording and resolution of complains and conflicts in re-using matters.	[8] [10] [11]
	<i>Public demand driven:</i> Response citizen centric by public demand	[1] [15]

Once the review and keywords search activities are done, similarities and differences between perspectives in previous literatures are determined in order to conclude what model(s) and/or perspectives will be suitable to the context of Thailand. There is no research identifying enterprise architecture and change management as the assessment perspective which becomes the key activity to transform previous government work process to government digitalized process. Driving open government data needs to change the structure of an organization (Enterprise architecture) and to determine the roles that different units play in the open government data program. Therefore, this research proposes a new workable open government data assessment model which has nine perspectives.

III. METHODOLOGY

In order to come up with a proposed framework and verifiable Open Government Data Assessment Process, this research consists of four stages;

A. Proposed Open Government Data Assessment Model

Stage 1: Reviews the existing status and progress of open government data assessment which focuses on the open government data representation and availability based on the open data principles.

Stage 2: Determines whether the open government data assessment components will be suitable to the context of Thailand.

Stage 3: Empirical investigations involving the in-depth interviews of 5 experts currently working in the fields of open government data in the Thai government agencies.

Stage 4: Summarizes and develops the assessment model.

Once the review and keywords research activities are done, similarities and differences between perspectives in previous literatures are determined in order to conclude what model(s) and/or perspectives will be suitable to the context of Thailand. A new open government data assessment model is then proposed with nine perspectives as follows: 1) Policies and Plans, 2) Laws and regulations, 3) Organizations, 4) Personal capabilities, 5) Enterprise architecture, 6) Technology Infrastructure, 7) Open government data principles 8) Innovation and 9) Participation. In total there are 34 indicators which are distributed in the 9 perspectives. The details are described below (See Table 2);

TABLE 2. NEW OPEN GOVERNMENT DATA ASSESSMENT MODEL

Criteria	Description	Indicator
Policy and Plan	The criteria determine the government's ability to OGD driven. It involves high level activities that allow government to set up policy, plan and vision including alignment with the international guidelines of national e-government	• Government policy • Government plan • Vision:

Criteria	Description	Indicator
	especially OGD.	
Law and regulations	It comprises the existence and adjustment of laws and regulations to support OGD implementation.	• <i>Laws and regulations</i> • <i>Directive</i> • <i>Government leadership</i>
Organization	These criteria include the abilities of organization to appropriately perform policy and commitment as planned.	• <i>Organization leadership</i> • <i>Organization policy</i> • <i>Commitments:</i>
Personal capabilities	This is the most important criteria to implement the OGD in Thailand due to lack of knowledge in technology and data operation in public organization.	• <i>Training</i> • <i>Personal evaluation</i>
Enterprise architecture	This perspective establishes the capability of organization to articulate a consistent of the OGD. The organization need to adjust the work process to be a digitalize system.	• <i>Enterprise architecture</i> • <i>Change management</i>
Technology Infrastructure	Involve the activities related to data portal, networking, metadata and data priority that technological support to the OGD.	• <i>Infrastructure</i> • <i>Portal</i> • <i>Interoperation</i> • <i>Networking</i> • <i>Metadata</i> • <i>Data priority</i>
Open Government Data Principle	The public data shall consider to release with these principles.	• <i>Completeness</i> • <i>Privacy</i> • <i>Timeliness</i> • <i>Electronic access</i> • <i>Machine Readability</i> • <i>Non-discrimination</i>
Innovation	The encouragement of stakeholders to create an innovation from data that released by government agencies via central portal.	• <i>Application</i> • <i>Product innovation</i>
Participation	It includes a certain level of the citizen's demand and their participation through the existing OGD communication channel.	• <i>Data access</i> • <i>Conflict and solution</i> • <i>Personal demand driven</i>

B. Perspective and indicator development

Indicators consisting of 9 perspectives were developed by reviewing existing literature. This qualitative research was conducted to improve these indicators. An in-depth interview structure was employed and each interview took approximately one to one and a half hours. The respondents were asked to describe an OGD implementation in the past, OGD problems and indicators for assessing OGD in Thailand. The data was collected during September and October 2016. Purposive sampling was utilized for five participants. They included 3 presidents and 2 experts in the fields of OGD in the following 5 government agencies:

1) Director of Electronic Government Agency (Public Organization) (www.ega.or.th)

2) Information strategic unit Director of National Innovation Agency (Public Organization) (www.nia.or.th)

3) Secretary General of National Science Technology and Innovation Policy Officer (www.sti.or.th)

4) Researcher of National Electronics and Computer Technology Center (www.nectec.or.th)

5) Director of the Office of The Official Information Commission (www.ioc.go.th)

The interview results were analysed by content analysis after the indicators were summarized to confirm the indicators lists and sent back to the five participants to verify the item objective congruence (IOC) with nine questionnaires. The results were calculated to show content validity.

$$IOC = \frac{\sum R}{N}$$

IOC = Item objective congruence
 R = Summary of the outcome of the expert opinions
 +1 = Congruence
 0 = Uncertain
 -1 = Incongruence

IV. RESEARCH RESULT

The in-depth interview results from the experts, identified 34 indicators as categorized in the 9 criteria. The progress and problems of OGD in Thailand are described below.

Policies and Plans: According to an in-depth interview with the director of Electronic Government Agency (EGA) which has the main role to implement EGOV and OGD in Thailand, we were informed that OGD has already been in practice for 2 years and EGA is currently providing a draft of OGD roadmap of the country. The Government of Thailand also emphasizes the use of digital technology to develop the economy. Even though the Thai Government will announce OGD roadmap soon, the secretary general of STI and researcher of NECTEC recommended that the prime minister

should direct all government agencies to reveal their data and define the indicators of each agency.

Laws and regulations: The Director of IOC who handles the official information act B.E. 2540 explained that all government agencies must disclose information which complies with section 7 and section 9 of the act which states that “A State agency shall at least publish the following official information in the Government Gazette such as organization structure, duties and other information as determined by the Board” Some parts of the act are now in the process of revision in order to improve it to meet current circumstances. The Director of EGA said the agency plans to update e-government act in parts of the official information act to be legible and support OGD implementation. However, the Secretary General of STI and the researcher of NECTEC argued that the process to revise laws and regulations takes a long time and will not be easy in Thailand.

Organization: The main problem to implement OGD in Thailand is the work process which most government agencies still have paper work to do and no guidelines and procedures for staffs. The Secretary General of STI said. Government agencies’ attitude and work culture of not revealing their data and retaining public service data within their systems is also another drawback. This idea was supported by the director of NIA information strategic unit. Therefore, the Director of IOC and EGA recommended that government agencies should have a responsible department and chief data officer to control OGD operation and support data driven process in the organization

Personal Capabilities: The Director of NIA’s information strategic unit recommended that the organization’s personnel should realize digital work processes such as digital literacy, create data in pilot table form or data visualization etc. The researcher of NECTEC added that the lack of digital knowledge and skills lead to low data quantity and quality. Therefore, the Thai government should further encourage OGD knowledge for both personnel and processes of government agencies.

Enterprise Architecture: This is the most important method to implement OGD in the transformation of government agencies to digital government agencies. The NECTEC researcher said that this method aligns functional business activities with an IT strategy and implementation plan and also provides a roadmap guideline and execution plan to the organization. Additionally, the Director of EGA described data operation analyst as the key transformational team supporting OGD implementation and data management system.

Technology Infrastructure: The Director of EGA explained that the government infrastructure has the government information network, the government cloud and the national central portal for open data named “www.data.go.th” which all government data that has been released in the portal can be found easily. However, the researcher of NECTEC mentioned that the software of the portal (data.go.th) was developed by a Thai agency which led

to difficulties to update some features and the disappearance of some functions such as XML catalog.

Open government data principles: The Director of EGA claimed that the determination of citizens’ demand for datasets via focus group in the community and from stakeholders have five groups of datasets that should be released to the public in the domains of public health, corruption, disaster, agriculture and city. However, the Secretary General of STI and the Director of IOC said there are currently a few datasets and low quality to generate an application or innovation.

Innovation: The Director of EGA explicated the activities to stimulate OGD such as Open Data Hackathon for developers to understand and create the revealed data for government agencies and exchange ideas within the group. Furthermore, STI partnership with NIA promoted Start up or entrepreneurs to bring government data for innovation.

Participation: The Secretary General of STI recommended that the released government data should originate from demand driven to meet the needs of citizens. Government agencies need to create social media communication to participate in government work.

The in-depth interview results are summarized in each criteria and indicators as shown below in Table 3.

TABLE 3. NEW OPEN GOVERNMENT DATA ASSESSMENT MODEL

Criteria	Items	Interview	IOC
Policy and Plan	Government policy	✓	✓
	Government plan	✓	✓
	Visions	✓	✓
Law and regulations	Laws and regulations	✓	✓
	Directive	✓	✓
	Government leadership	✓	
Organization	Organization leadership	✓	
	Organization policy	✓	✓
	Commitments	✓	✓
	Data responsible department	✓	✓
Personal capabilities	Training	✓	✓
	Personal evaluations	✓	✓
Enterprise architecture	Enterprise architecture	✓	✓
	Change management	✓	✓
	Process transformation	✓	✓
	Data Operation	✓	✓
Technology Infrastructure	Infrastructure	✓	✓
	OGD portal	✓	✓
	Interoperation	✓	✓
	Networking	✓	✓
	Metadata	✓	✓
	Data priority	✓	✓
Open government data principle	Completeness	✓	✓
	Privacy	✓	✓
	Timeliness	✓	✓

Criteria	Items	Interview	IOC
	Electronic access	✓	✓
	Machine Readability	✓	✓
	Non-discrimination	✓	✓
	Licensing	✓	✓
	Permanence	✓	✓
	Usage Costs	✓	✓
	Use of Commonly Owned Standards(	✓	✓
Innovation	Applications	✓	✓
	Product innovation	✓	✓
Participation	Data access	✓	✓
	Complaints and solutions	✓	✓
	Public demand driven	✓	✓

The questionnaire results which included 3 indicators recommended from 5 experts indicated that 35 of the 37 indicators had an IOC score of over 0.5, which explains the high validity of its contents as shown in Appendix 1.

V. CONCLUSIONS

The concept of open government data is to enable citizens and allows them to have access to public data for free and without restrictions. To assess the extent of open government data in Thailand, this research proposes a new workable open government data assessment model. The research result shows that the components to assess OGD contain nine crucial components in order of importance as follows: Policies and Plans, Laws and regulations, Organization, Personal capabilities, Enterprise architecture, Technology Infrastructure, Open government data principles, Innovation and Participation. Based on in-depth interviews, experts' recommendations from the Director of Electronic Government Agency (Public Organization), the Director of the Office of The Official Information Commission and the Secretary General of the National Science Technology and Innovation Policy Office showed that these 3 indicators should be considered to be the main indicators for OGD. These three indicators are: 1) Data responsible department (Organization perspective) that is the main person or department directly in charge. 2) Process transformation describes the change from the normal process to the digitalized process and 3) Data operation that involves data analytic and commercial data processing (Enterprise architecture) that is the key activities involve in the transformation of the previous government work process to the government digitalized process. Driving open government data needs to change the structure of an organization, process transformation and data. However, verifying the item objective congruence (IOC) showed that these two indicators- Government leadership and Organization leadership failed.

To conclude the result of an indicator for development, the final model of OGD can be summarized as follows:

1. *Policies and Plans* deal with Government policies, Government plans and Visions.
2. *Laws and regulations* consist of Laws and regulations and directives.

3. *Organization* includes Organization policy, Commitment and Data responsible department
4. *Personal capabilities* comprise of Training and Personal evaluations
5. *Enterprise architecture* consists of Enterprise architecture, Change management, Process transformation and Data Operation
6. *Technology Infrastructure* contains Infrastructure, OGD portal, Interoperations, Networking, Metadata and Data priority
7. *Open government data principles*
8. *Innovation* has Applications and Product innovation
9. *Participation* includes Data access, Complaints and solutions and Public demand driven

In particular, it has been concluded that OGD assessment model has key features to implement OGD capabilities for public organizations in Thailand and the assessment model allows a government agency to assess its digital government stage from operational level and trustable data.

Future research is required to validate the reliability of OGD by sending a questionnaire with the five-point Likert scale to 39 public organizations in Thailand. This will therefore, provide guidelines and the best practice for public organizations in Thailand to implement OGD

REFERENCES

- [1] A. Zuiderwijk, N. Helbig, J. R. Gil-Garcia, and M. Janssen, "Special Issue on Innovation through Open Data - A Review of the State-of-the-Art and an Emerging Research Agenda" Guest Editors' Introduction. *Journal of theoretical and applied electronic commerce research*, 9(2), 1-2. doi: 10.4067/s0718-18762014000200001 (2014).
- [2] B. Ubaldi, "Open Government Data TOWARDS EMPIRICAL ANALYSIS OF OPEN GOVERNMENT DATA INITIATIVES. doi: 10.1787/5k46bj4f03s7-en (2013).
- [3] C. Alexopoulos, E. Loukis, S. Mouzakitis, M. Petychakis and Y. Charalabidis., "Analysing the Characteristics of Open Government Data Sources in Greece" ©Springer Science+Business Media New York 2015
- [4] D. Sayogo, T. Pardo and M. Cook, "A Framework for Benchmarking Open Government Data Efforts" *IEEE 47th Hawaii International Conference on System Science* 1896-1905. doi: 10.1109/hicss.2014.240
- [5] Electronic Government Agency (Public Organization) [Online]. "Thailand's three year Digital Government Plan (2016-2018), 2016 Available: https://www.ega.or.th/upload/download/file_430e6925f329591155fb3801cdd08d60.pdf
- [6] E. Kalampokis, E. Tambouris and K. Tarabanis, "Open Government Data: A Stage Model" ©IFIP International Federation for Information Processing: EGOV 2011, LNCS 6846, pp. 235-246, 2011
- [7] E. Loukis, Y. Charalabidis and A. Androutsopoulou, "Evaluating a Passive Social Media Citizensourcing Innovation". 9248, 305-320. doi: 10.1007/978-3-319-22479-4_23, 2015.
- [8] E. Stylin, N. Dmitrieva and A. Zhulin, "Openness Evaluation Framework for Public Agencies". *ICEGOV'13, October 22-25, 2013, Seoul, South Korea*.
- [9] G. Lee and Y. Kwak, "An Open Government Maturity Model for social media-based public engagement" *Government Information Quarterly*. 29, 492-503 (2012).
- [10] H. J. Wang and J. Lo, "Adoption of open government data among government agencies". *Government Information Quarterly*, 33(1), 80-88. doi: 10.1016/j.giq.2015.11.004
- [11] J. Bertot, P. McDermott and T. Smith, "Measurement of Open Government: Metrics and Process" *IEEE 45th Hawaii International*

Conference on System Sciences, 2491-2499. doi: 10.1109/hicss.2012.658, 2012

- [12] J. Huntgeburth and D. Veit, "Evaluating Open Government Initiatives" © Springer International Publishing Switzerland 2015
- [13] M. Solar, G. Concha and L. Meijueiro, "A Model to Assess Open Government Data in Public Agencies" ©IFIP International Federation for Information Processing: EGOV, 2012 LNCS 7443, pp. 210-221
- [14] N. Veljković, S. Bogdanović-Dinić and L. Stoimenov, "Benchmarking open government: An open data perspective" *Government Information Quarterly* © 2014 Elsevier Inc. All rights reserved
- [15] P. Parycek, J. Höchtl and M. Ginner, "Open Government Data Implementation Evaluation". *Journal of theoretical and applied electronic commerce research*, 9(2), 13-14. doi: 10.4067/s0718-18762014000200007, 2014
- [16] R. Almazan and J. Garcia., "Towards an Evaluation Model for Open Government: A Preliminary Proposal" *IFIP International Federation for Information Processing: EGOV 2014*, LNCS 8653, pp. 47-58, 2014
- [17] R. Caplan, T. Davies, A. Wadud, S. Verhulst, J. M. Alonso and H. Farhan, "Towards common methods for assessing open data: workshop report & draft framework. *GOVLAB* (2014), *World Wide Web Foundation*.
- [18] R. P. Lourenço and Serra L., "An Online Transparency for Accountability Maturity Model". *IFIP International Federation for Information Processing, EGOV 2014, LNCS 8653*, pp. 35-46.



S. Chatipot,

Nakhon Si Thammarat, April 28, 1984
Bachelor's degree: Electrical Engineer, King Mongkut's University of Technology North Bangkok, Bangkok, Thailand 2008
Master's degree: Financial Mathematics, Brunel University, London, UK 2012

He finished Military Service Training of Territorial Defence Course,
Current job: Business Continuity Management Manager, Krunghthai-AXA Life Insurance PLC.

Previous: Senior Risk Analyst, electronic Government agency (public organization)

Current research interests: E-government, Open government, Open Data

Mr. Srimuang is now PhD candidate in Technopreneurship and Innovation Management Program, Graduate School, Chulalongkorn University, Thailand



C. Nagul,

Bachelor Degree in Computer Science Mahidol University International College, Bangkok (Second Class Honours) 1996
Master Degree in Information and Communication Engineering University of Tokyo, Japan
Doctoral Degree in Information and Communication Engineering University of Tokyo, Japan

He is now current work at Associate Professor, Department of Mathematics and Computer Science, Chulalongkorn University

Associate Prof. Cooharajanone has now research Interest: Digital Video and Image Processing, Gesture Detection in Video Surveillance, Video Surveillance Summarization, Medical and Biological Image Processing, User Interface and Usability in Computer and Website, User Interface and Usability in Transportation, Human Behavior in Computer, e-Government
Web page: <http://pioneer.netserv.chula.ac.th/~cnagul/index.html>

Publication:

- Nagul Cooharajanone, Siriwat Kasamwattananrote, Rajalida Lipikorn and Shin'ichi Satoh, "Automated Real-Time Video Surveillance Summarization

Framework", *Journal of Real-Time Image Processing*, Springer, pp. 513-532, 2015. (ISSN: 1861-8200) (IF = 2.020)

Akkaraphan Janetheerapong, Nagul Cooharajanone, Anan Wattanatham, and Rajalida Lipikorn, "Three Dimensional Lung Nodule

- Segmentation and Estimation Using Thresholding on Local Thickness", *Proceedings of IEEE International Conference on Signal Processing, Communications and Computing*, pp. 593-596, Aug 13 -15, 2012. (ISBN 978-1-4673-2192-1)

- Nagul Cooharajanone, Pongjit Kongnim, Aratchaporn Mongkolnut and Hitoshi Okada, "Evaluation Study of Usability Factors on Mobile Payment Application on Two Different Service Providers in Thailand", *The 12th IEEE/IPSJ International Symposium on Applications and the Internet*, pp.233-238, Jul 16-20, 2012. (ISBN 978-1-4673-2001-6)

- Peera Chotimanus, Suphakant Phimoltare, Nagul Cooharajanone, "Real swing Extraction for Video indexing in Golf Practice Video", *IEEE International Conference on Computing, Communications & Applications*, pp. 420-425, Jan 11-13, 2012. (ISBN 978-1-4577-1717-8)



T. Uthai,

Bachelor Degree: Graduate Diploma Auditing, Chulalongkorn University
Master of Science Business administration, University of Illinois, USA
Doctor of Philosophy Business administration, University of Illinois, USA.

She is now Professor at Department of Accountancy, Chulalongkorn Business School, Chulalongkorn University, Thailand

Prof. Tanlamai has now research Interest: Business Visualization, Risk management, e-Government

Publication:

- Learning Experience and Acceptance of Interface Features of the Computer Assisted Learning on Deferred Tax Account. *WMS journal of management*, Volume 5, Number 1, pp.13-25 2016

- Learning Outcome from the Use of computer assisted Learning on Consolidated Financial Statement. *BEC Journal of naresuan University V.10* 2015

- Graphs Used in ASEAN Trading Link's Annual Reports: Evidence from Thailand, Malaysia, and Singapore. *Journal of Information Technology and Management*, 2015, Vol 22, No. pp. 65-81 2015



C. Achara

Ph.D. (Quantitative Business Analysis) Arizona State University

She is now Professor at Department of Commerce, Chulalongkorn Business School, Chulalongkorn University, Thailand

Prof. Chandrachai has now research Interest:

Publication:

- A multi-facet approach using conceptualization, application, and usability measurement to developing financial learning system for hospital, 2016 *IEEE/ACIS 15th International Conference on Computer and Information Science (ICIS)*, pp 1-5

- Factors Influencing Innovative Inventory Pooling System (IIPS) Adoption for Retail Entrepreneurs in Thailand, *Journal of Advanced Management Science* Vol 4. 2016/11

- Indicators of knowledge management capability for KM effectiveness, *Emerald Group Publishing Limited* 2010, Vol 40, pp 183-203

- Evaluation model for research and development commercialization capability, *Production & Manufacturing Research* 2014 Vol 2, pp .586-602
Web page:

<https://scholar.google.co.th/citations?user=YSWOjWIAAAAJ&hl=en&cstart=0&pagesize=20>